Natural Farming at Aman Bagh

2 October 2017

Table of Contents

Figures

All photographs taken by Harsh Lohit at Aman Bagh
Find more at www.sacredspaces.in

Natural Farming at Aman Bagh
Introduction

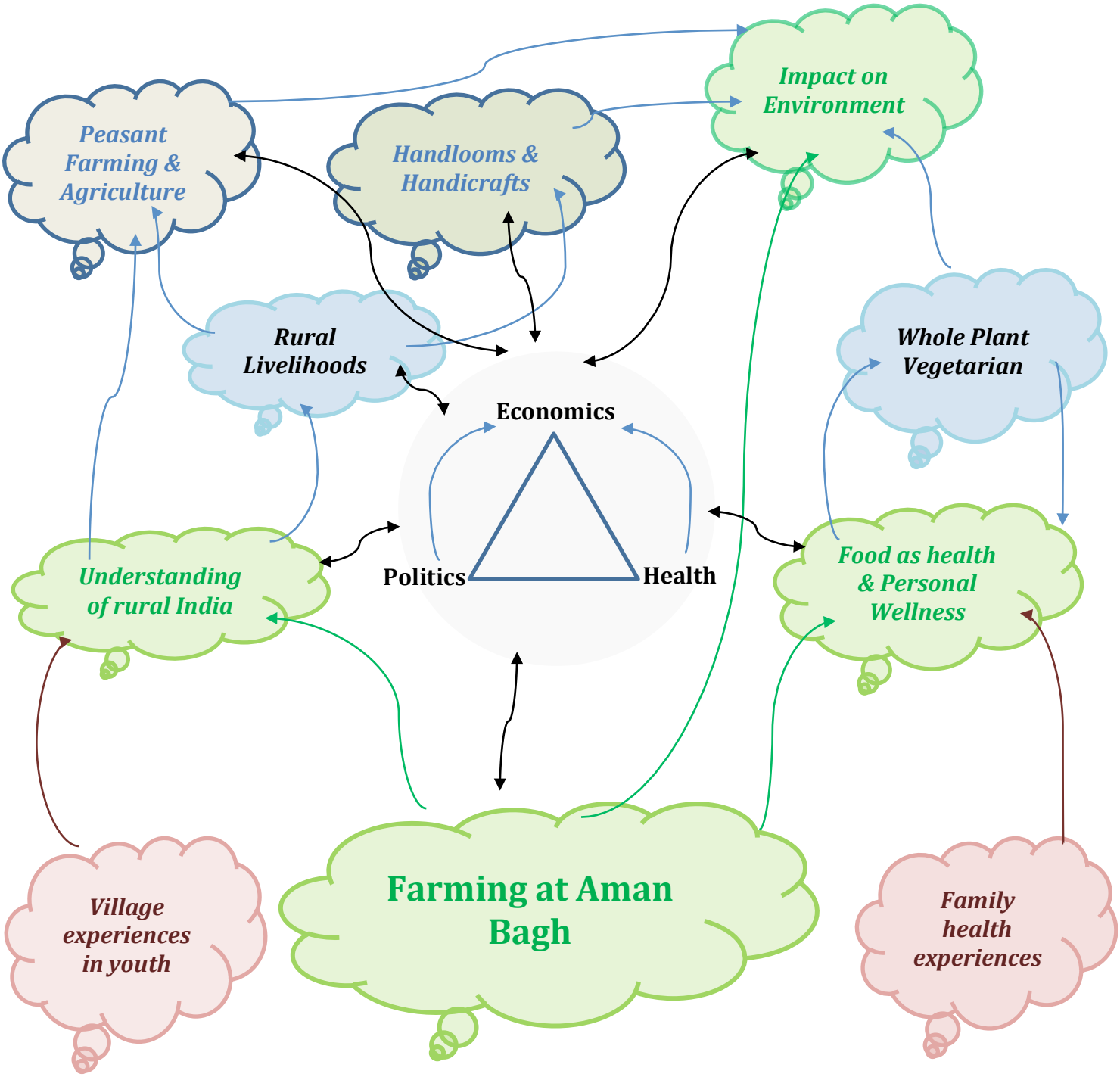
Farming Feeds

Natural farming has been a journey of self-discovery and transformation since I first applied the sustainable ways of my peasant ancestors in early 2012 on 6 acres at Aman Bagh in south Haryana. My journey commenced with a simple story of 'No chemicals!' and has taken me to places I could not then imagine. I have moved from tractor tilling, to bullock ploughing, to partly no-till; from mono-cropping to crop rotation, multi-cropping and green manuring; from annual food crops and the plough-violence that entails on the soil to 50% perennial bio-diverse fruit 'forests'; from focusing on above-the-soil production to understanding the world of life below the soil; and building the biology in the soil by adding quantities of biomass.

In return for engaging mindfully with the earth, she transmitted to me a heightened awareness of rural India where land is scarce and people many times more than can gainfully live off it; and the reality that the marginal and small peasants, the landless and sundry small artisans and vast army of rural underemployed are yet 65% of our vast population. We will have over 800 million people in the villages even in 2030, when a much greater percentage of us will be in the cities than today. The village is not going away anytime soon in India.

I also learnt of the interconnectedness of our terrible inequality with the enormous power of the urban, high-caste elite, as well as the modern corporations managed by this elite, in our consumer market driven economy. I understood the ongoing devastation of handloom and craft livelihoods, the terrifying state of and prognosis for our environment, the intensive overuse of chemicals in growing food in what was so recently an organic-by-default nation, our unhealthy individual food choices in what is the world's only vegetarian-cuisine nation, and the ongoing destruction of individual health.

I have moved in these 5 years from growing food for my body, to feeding my soul.



Discovering an Interrelated World

I have learnt farming by absorbing much of what my peasant farmhands have taught me and by integrating forgotten traditions as well as new practices from across the world. My focus is to continue building a community in Aman Bagh that provides a compassionate and supportive work environment for the marginal peasants who work with me, to establish a establish a low-input and bio-diverse perennial farming ecosystem environmentally sustainable in as many ways as possible and fossil-fuel phobic, a farming system suited to the ecology of my area and to the genius of the food cropping systems that have been established for millennia in this region. To paraphrase Gandhi, I have opened the windows of my mind wide to allow in the waft of new ideas on farming, nutrition and food, but I remain rooted in my traditions and will not be blown off my feet.

I also find no possibility for the individual awakened to the multiple challenges of agriculture in India to look on farming solely or even primarily as a question of healthy food choices. It is all interconnected. Natural farming has necessarily to be a vigorous political statement opposing the dominance of the market by which the rural (peasant and landless alike) are effectively shut out of an urban-biased system. Michael Lipton stated pithily 'the village gets the lip service and sympathy, while the city gets the capital'. I address some of these thoughts in another essay 'Why Do Farmers Protest'.

Nothing I write on natural farming approaches and methods in this essay is revolutionary or original; I only document what I have learnt from the peasants who work with me, other natural farmers, from natural systems discovered by reading the pioneers of natural farming, and from my short five years of experiences and mistakes. Gershuny & Smillie state "There are as many different concepts of farming as there are farmers" – these are given multiple names: *Jaivic*, organic, *Rishi Kheti,* permaculture, sustainable, biological, and agro-ecology. These all include a wide range of similar methods that enable humans engage with nature to grow food in a mindful, ecologically sustainable manner. 'Ecological' is used here in its broadest sense, including within its fold the entire scope of interrelationships - political, economical and social - of all living things with the environment.

All the packages of natural practices I mention here are well documented and are being practiced by millions of farmers across the world, including in India. I hope my experiences can serve as a helpful guide to others experimenting or struggling with natural farming methods in a similar ecology, for which necessarily a Hindi essay will be made available.

At the mechanical or operational level, there is no end of the challenges of nature in traditional organic or indeed in contemporary conventional chemical farming. Nature is always unpredictable with water, wind, sun, crop pests, weeds; the work is physically demanding and lonely; farming is not remunerative for any of the hundreds of millions of small-holding farmers across our nation who live a life of subsistence; the markets fail and so does the government in supporting the farmer when he needs it the most; and inputs are increasingly expensive in chemical and fossil-fuel based farming. Every player across the input chain – seed, fertiliser, pesticide, machinery, trader – makes money, and the consumer pushes down the price of food by his clout in the system. Only the farmer loses.

Rural Heritage

My peasant ancestors were hardy farmers in what was once undivided Punjab and today is Haryana before migrating to Bulandshahr & Meerut districts in Uttar Pradesh over the past few centuries as pressure on land increased. They were the salt of the earth – mostly small or marginal tenants before the abolition of *Zamindari* post-independence in the early 1950s.

Even after that they remained small farmers, only a few owning land more than 5 acres. (Since then, farms have fragmented with each generation and farms in India are on average slightly more than 1 acre). All of them were 'organic-by-default' peasants till the late 1960s, and the long-established ways of their ancestors enabled them retain the fertility of their land over millennia of intensive farming. After the chemical-led Green Revolution in the 1970s that accelerated over the coming decades they became slaves to the 'market', lost their organic connect to the land and have become addicts to chemical poisons from distant factories. The local cycle of environmental sustainability – of growth and decay, as Albert Howard reminds us - was broken and fertiliser, pesticides, seeds, electricity and tractors were supplied to them as resources to exploit the land for production; and the farm became just another factory.

I spent multiple long annual vacations in my father's ancestral village just 100 kilometers from Delhi, though light years away from urban India, till I started to rebel in my teens on leaving friends and city comforts behind. My country cousins remain farmers today, though sadly they no longer follow the sustainable ways of our peasant ancestors. I gained so much from Kartari Devi, my farmer grandmother (her husband died at 50, leaving her 5 acres and little else) a powerful work ethic of incessant work from dawn to dusk, a desire to fight the odds, an independence of spirit, and compassion for the underprivileged. My father Dr. Jai Pal Singh was an academically brilliant man who migrated from the village to become a government surgeon in Delhi. Villagers from scores of miles around Delhi flocked to him knowing they now had one of their own in the unwelcoming city. He never let them down; they were always provided priority in his hospitals in every way he could provide it. When he did briefly practice privately after his retirement, he operated for free on villagers. We had a constant stream of village relatives and community (of all castes) needing medical assistance, he undertook the marriage of many rural cousins, and in general was the pillar of strength in that family. Hence, the rough-hewn peasant, in his white simple *Khadi* (handspun and hand-woven) clothes, with his colloquial language and laconic sense of humor, is diffused sympathetically in my imagination. A peasant was always family, a hero who stoically battled the elements to feed the world with little returns for himself, and not an unshaven '*ganwar*' (village buffoon) as my city friends generally believed.

My maternal grandfather was Charan Singh, the pre-eminent peasant leader and rural intellectual of independent India, and the deep imprint of his simplicity, exemplary personal character, personality and thoughts will need a separate essay. I was 25 when he passed, and I had spent the last decade of his life spent in Delhi basking in his vast, loving and motivating presence. He influences me at another level now as I comprehend and protect for posterity his vast intellectual heritage (over 10 books, and numerous other writings for example) on the imbalance between rural and urban India, of the meaning and methods of Indian development, his prescription of agriculture first and last in India, handloom-handicrafts and other village and small industry as the solution for rural livelihoods, and appropriate large industry and technology (in that sequence) as a sustainable and equitable path for India's masses. He wanted people to move off agriculture as soon as society could afford this, but they had to have something productive to do while they were in the village (hence agriculture for the peasants and non-farm employment for the landless) and something to do when they reached the city (he predicted India would always have large numbers in the village as there just weren't enough urban jobs for our multitudes). He stood for small peasants, organic farming methods, small irrigation projects, small industry; green before his time.

This connect with rural life in my younger years, and my involvement with political thinking as a way of life, established a life-long intellectual engagement with the central idea of widespread inequality and the rural-urban conflict. While I hold a visceral and emotional

connect to the sounds, smells and the language of the village, I realised early on in my youth that the village was a den of inequality and exploitation through the multiple uniquely Indian divisive and controlling forces of caste, patriarchy and religion. I transcended the deep divide of religion for myself when I married a Muslim girl in 1985, through whom my mind was opened to transcending the insidious 'single story' of the Muslim as a Muslim. I was slowly able to construct my own stories of the many identities that Muslims inhabit, and nothing I see there today convinces me any religion including of course Islam has the better solution. In India though, we have to engage with religion if only to know how to deal with it. The futility of the ideology of religion, and their unique rituals, gods, prophets, superstitions is yet another essay.

When I decided to break decisively from corporate life in the information technology industry in 2011 – I was 51 - farming was a natural destination. I thought farming would be occupying, keep me in natural and healthy surroundings and I would grow clean food for the family. These were all relatively simple expectations, and all came true.

But nothing could have prepared me for the complete change in worldview that this reconnect with the ways of my ancestors has wrought.

"There has always been lack of equilibrium, rather a sort of antagonism between cities and the countryside. This is particularly so in our land where the gulf of inequality between the capitalist class and the working-class pales into insignificance before that which exists between the peasant farmer in our village and the middle-class town dweller. India is really two worlds-rural and urban. The relationship between the countryside and the cities is, therefore, a vital problem to us."

Charan Singh, *India's Economic Nightmare.* 1984

Natural Farming at Aman Bagh
Part II: 2012-2014

I had to absorb generations of knowledge while on the job, in addition to reviving forgotten traditional practices lost to 'lazy' chemical farming, for a natural farm to start to take shape on the sandy, degraded, low organic matter land in the Mangar valley. This '*Bhur*' (sandy) soil was quite unlike the alluvial, silt soil of my village in Bulandshahr next to the Ganges.

Aman Bagh, June 2012.

Aman Bagh is in the hot & arid south-west region of Haryana, receiving 300-500 mm rain a year; 80% of this in the months of July and August. Strong NW winds blow in May, when the sun can take the temperature in the soil to 50 degrees Centigrade. Our soil is 'coarse sand', very low (<0.2%) in organic matter. We are located in the Mangar valley where the surrounding Aravalli hill range radiates heat in the summer and traps cold in the winter thereby creating a challenging microclimate for most of the year. We experience extreme temperatures, from a low of 5 degrees C in January to 47 degrees C in May, and high humidity in the 3 monsoon months.

Haryana is an 'intensively cultivated' state, and only 3.5% of our state's land is forests - mostly unregulated, and degraded land planted with the invasive *Prosopis Juliflora*. There has been a drastic reduction in area under coarse cereals and lentils since 1950, and farmers grow rice, wheat, fruits & vegetables, cotton, sugarcane. Haryana applies the second highest amount of fertilisers & pesticides in India after Punjab. 53% of state uses groundwater irrigation, a limited resource that reduces each year. Haryana exhibits all the ills of market and industrial agriculture as well as unregulated urbanisation: air, water, and soil pollution.

The People Challenge

Finding the right people to run the farm was a foundational decision, I learnt this lesson in the corporate world where our 5,000-strong global software services company ran only as well as the character and abilities of the leadership at multiple levels. I was in an alien village, an outsider to the ecosystem already hostile and suspicious of the urban investor since Delhi's growth overflowed into Haryana in the early 2000s. I also knew that the peasant is a transformed man when he works his own land, and is a much lazier one working on someone else's. I needed to find men and women with a strong work and moral ethic who I could convince, through good wages, caring and compassion, to treat Aman Bagh as their own. I needed to get lucky here, and I did.

I was able to call upon two young peasants from Bihar possessing a rudimentary understanding of farming, and soon five peasants from nearby villages who worked as casual labor cleaning up the land in the first few weeks in May 2012. I quickly realized the locals possessed ethics and knowledge closer to what I thought were ideal. Seven were too many hands for our limited land, but I had no idea then what it would take to sow, till, irrigate and harvest, look after the cattle and all the other farm work; I took refuge in numbers. The two Bihari men, by serendipity, could not handle the separation from their families and left that year itself after serving their useful pioneering purpose.

We retain our original five local peasants, and have since built a camaraderie based on mutual interests and respect. Four of them are from Dhauj, a majority Muslim village close to Mangar, and share with the locally dominant Hindu Gujjar peasants' the language and all aspects of an agrarian way of life. They have little in common with their urban co-religionists, but preachers live to extract a commonality of ideology. Rajan, our cook with magic in her hands, is a landless Dalit from the *Chamar* (once the leather skinning) community. She works as hard as any of the men, all seven days of the week. They get time off when they need, and I've realised they enjoy the discipline of work and would rather be here than at home or elsewhere.

The Aman Bagh Five, 2013.

There is a powerful localization lesson in this: all the 5 are local marginal or landless peasants, they understand the local cropping patterns, the weather, the seeds, the soil, the cattle, the food; and they are embedded in a local, community network that is immensely helpful in all kinds of situations. Abdul Sattar, the supervisor, is a walking encyclopedia of local farming and ecological knowledge and has been my teacher in the ways of traditional farming. It is a tragedy of contemporary civilization that a peasant can be labeled unskilled and uneducated simply because he hasn't studied in the formal school system. In his environment, he is one of the most intelligent and certainly the most knowledgeable man I have come across: if he had not been with Aman Bagh, my journey would have been extremely painful and indeed would likely not have taken the positive path that it has. My Master's degree in business and three decades of corporate work experience was of no use in front of the generations of knowledge he is able to apply: I am the unskilled one, and have no hesitation in accepting this. Should education and literacy be separated from experiential and traditional oral forms of transmitting inter-generational knowledge? Children in the village school are taught English, Hindi, math, science – and nothing about agriculture or the pastoral way of life, the primary way of their people for many generations. They grow up believing the break between what they learn at school and live at home is because of the superiority of classroom learning from books written by urban ideologues. The stripping of the rural of his self-respect is obvious; as someone said "if we start the story with the city as the ultimate resting place, then the village is the place to flee". India must find a way to reconcile the two, to understand the village way of life as it was and integrate it with what 'could be'. Modernity comes at such a frightening pace, though, that we've lost the plot even before we comprehend where we are.

Peasants in India are conservative and generally slow to change. They are risk averse due to their life of subsistence, they know life in nature is unpredictable and always balanced on a thin knife-edge, and implementing anything unproven can possibly bring their brittle world crashing down. Sattar too was slow and cautious, skeptical, and opposed reviving the old ways of his grandfather as he clung to the security of chemical farming. This needed initial firmness on the key boundary condition of farming at Aman Bagh: no chemicals, no matter what the urgency. The real work could begin only once this became established, which took years. I must confess there are times where he secretly hopes we could use some pesticide, some urea.

Manure, Irrigation and Seeds

The two key operational issues I grappled with first were organic fertilization of the sandy, low-carbon soil and the need for responsible irrigation. Cattle were the essential solution for natural farming, important for their dung rather than their milk as an agriculturist scientist from PUSA in Delhi shared with me; perhaps the only good thing that came out of that bureaucratic symbol of a closed scientific mind. Indian traditions integrated cattle and farming in a manner unprecedented in world agriculture, and this is one of the secrets of the fertility of our soil. This came as a startling revelation, and I started to understand the reverence the cow has in the eyes of the villager: its dung formed the foundation of soil fertility over millennia of intensive farming, its milk the basis of family nutrition, and bullocks the only source of energy till the 1960s.

For irrigation, we sunk a bore-well to 100 feet (sweet water was struck at 50 feet) and invested in a comprehensive drip and sprinkler system that grids the entire farm to minimise both water use and irrigation effort. Little did I realise in 2012 that underground aquifer water is a limited resource under severe stress as we extract more than we put back. This is

especially true for Aman Bagh where a once large, natural perennial pond that abuts our land is now a dry bed and encroached agricultural land. It can be revived, I am sure, but the energy required will be enormous. Who knows, one day.

I started to understand seeds in 2013: the differences between open pollinated (or heirloom), hybrid and GMO; and the need to save my own seeds as part of sustainability ('Seed *Swarajya'*) and controlling input costs. The traditional village system of exchanging seeds with neighboring farmers is non-existent today, and I had to seek out *desi* (local) seeds from others that I could save and re-use. For example, I bought indigenous tall wheat variety MP306 from the wonderful seed-saving NGO Navdanya, and we use these as seeds till date. Sattar buys open-pollinated seeds that are yet available at the village seed store for common crops like mustard, millet, sorghum, oats, clover and many vegetables. Local seeds are genetically suited to our soil, moisture and ecology; they often thrive when seeds from outside fail.

We implemented the cycle of traditional cropping on all the land: ploughing, sowing, watering, de-weeding and reaping; and again. This wasn't stressful on my men and woman, as they knew this life and it gave them plenty of down time between cycles – why we see farmers lounging around in the village. I knew nothing about growing food without ploughing.

Bullocks

For the first year, we used a hired tractor (though we were advised a small tractor was an absolute necessity), in the next year we hired a set of bullocks with a peasant *hali* (plough-man) from Dhauj village (he has since retired himself and sold his bullocks), and in 2013 we purchased our own pair of breed bullocks for the princely sum of rupees 14,000 from the neighboring village of Bandhwari. Momi was appointed our resident expert *hali*, and he is absolutely brilliant as he navigates them with expertise and ease. Dalsher and Shamsher, our bullocks, cost us a fraction of a tractor, live off the hay and green-feed from our land, give us valuable dung that we use as manure, haven't once fallen sick, and retain employment within the community. The tractor is expensive, replaces labour in a country whose biggest problem is creating employment for the rural poor, uses expensive imported diesel and all that entails, voids polluting diesel fumes, costs an enormous amount to maintain, and makes Mahindra & Mahindra richer. For Indian small farms, 80% of all farming households, shared bullock services supported by government loans would be an ideal solution if we weren't blinkered by the ideology of modernity.

Dalsher

I knew nothing yet of the violence ploughing does to the soil (especially deep tractor ploughing, with all its fancy iron attachments) in India's arid or tropical environments: the breaking of the soil structure, the compacting of soil, exposure of soil to the elements where precious carbon escapes to the atmosphere as CO_2, and the loss of moisture. "No Till" farming, as practiced by the Japanese sage-farmer Masanobu Fukuoka was yet in the womb of the future. I had read his 'One Straw Revolution' in my youth, without understanding it one bit; I went through it again. How could one grow food without tilling, it was unthinkable. Actually, what I had to do was redefine food and nutrition in my head as fruits and harvests from perennial trees and not just annual cereals and lentil, but that thinking was a distance away.

I had now to learn how to grow a range of food. While Sattar understood the lifecycle of cereals, oilseeds, cattle fodder and other local crops like *Til* (Sesame), *Guar* (Cluster Beans) and *Sunn* (Sunn Hemp) extremely well but he had only a faint idea how to grow fruits and vegetables.

We had to learn through doing, painful as it was, but our mistakes taught us each season. It also taught me patience, as the learning from the current season in one fruit orchard could only be implemented after 12 months. I researched which trees would do well in our ecology, with least water, and citrus, guava and mango were the choices that stand validated today. Four groves were planted with fruit saplings in the monsoons of 2012 and 2013, each then a monoculture of one kind of fruit tree, and planting saplings was an art we learnt and got better at each year. We continued to plough the orchards and plant inter-crops of one kind or another, mainly low-rise lentils that didn't interfere with the fruit saplings and indeed helped by adding nitrogen to the fruit orchard soil. Fruit trees need caring for the first 3-4 years of their life, and then depending on which variety, the tree lasts from 15 to 50 years. Besides being a stable source of produce, fruit trees are perennial and eliminate the physically demanding cycle of ploughing-sowing-harvesting. Fruit replacing cereal as food is a novel

concept without much traction in society, but at a farm replacing cereals with fruits does away with the repetitive cycle of drudgery for the peasant. We were moving towards a via media, one that allowed us to do both.

Cattle

Another key expertise required was cattle, of which I knew nothing. Sattar and the others on the other hand were well versed in cattle rearing, and each of them has a buffalo or more for nutrition at home and for selling milk for additional income. Few kept cows in 2012, as they give less milk with a lower fat content, and today the cow is on the way to extinction due to the extreme rules for the protection of all cattle from slaughter. If a domesticated animal outlives its economic utility, it will go extinct no matter what organized religion says. We had to buy them, and we went to the cattle markets of Muzaffarnagar and Karnal, at a time when *gau rakshaks* (religious goons) did not patrol the roads. I had a production mindset of keeping 'high-yielding' *Sahiwal* cows (from Sahiwal district, now in Pakistan Punjab) that promise 12-15 kg of milk. I knew vaguely that the mixed breeds – Indian breeds fathered by Jersey and Friesian bulls from Europe - would not be able to handle our ecology, but little did I know that the cows we bought as Sahiwal from cattle fairs were actually significantly mixed breeds. We were stumped for pure Sahiwal semen, and were forced to depend on artificial insemination that simply didn't work. It cost rupees 500 each time whether it worked or not, there was no guarantee that the semen was actually Sahiwal (one of the offspring looked quite like a buffalo): the government compounder made money for sure. We even reared a Sahiwal bull for 3 years, but this was too much too late as and we lost two of our three gentle Sahiwal cows within the year to unknown diseases before he came of age. That hurt terribly, and we ultimately gave him away too.

It was an expensive experiment. I learnt that local, hardy *Hariana* cattle - with genes that protect them from the heat, cold, winds and diseases of our area - from within a few miles of Aman Bagh provide the best life-cycle investment. Indian farmers have learnt this lesson: the mixed breed cows may give more milk (European cows give upwards of 30 kg a day versus 2-15 kg from Indian breeds) but their progeny are so poorly adapted to our hot and humid environment that they either die or live on antibiotics. Instead of improving our own breeds using local bulls and European and American scientific methods, some dolt took the easy way out and imported pure-bred Jersey and Friesian bulls from cold, temperate lands to mate with Indian cows - and forever killed the Indian breed and its possible revival.

I also learnt that the local government veterinary extension services are quite useless in Haryana: the government doctor is never to be seen, and the government compounder goes home to home in the village making money for himself by the thoughtless administration of antibiotics and other powerful allopathic medicines of which he has little knowledge. If only they were taught a first line of defense of time tested local, herbal remedies; then homeopathic and finally allopathic as the last line of defense in extreme or life-threatening conditions. But this succession of medication doesn't work for human health in India with our long traditional of herbal and natural medicine, what are cattle.

Aman Bagh has moved, over these years, to an equilibrium of three *desi* cows and our pair of bullocks that can be sustained by the green fodder and hay off a portion of our land, and all of these are the *Hariana* breed that gives less milk (5-6 kg a day in milking period) but rarely fall sick and don't need the visits of the moneymaking compounder. Instead of focusing on high-input, high-yield revenue, we moved to low-input, low-maintenance. Local won yet again. Thanks to Sagari Ramdas, a veterinary doctor in faraway Andhra Pradesh with a big heart and

even deeper knowledge who helped us numerous times, and her book on treating cattle we learnt that balanced nutrition was crucial to cattle health (as indeed for the soil and for ourselves), and we learnt herbal medical solutions (feeding all the cattle *neem* leaves every Friday, *neem* juice to the new born as de-wormer) as well as cattle homeopathy, and they have responded by not falling sick.

Gobar Gas

Manuring was super critical, and while we spread the dung from our own cattle first, but it was inadequate quantity to build the fertility of our dry, sandy soil. Every family in the villages around have many heads of cattle and buffalo, primarily as the cattle rearing *Gujjar* and *Meo* communities are dominant, and I thought it would be a once in a while operation to truck in dung from the villagers who had more than they needed. Not surprisingly, I need to buy and apply dung twice a year.

In 2013 we obtained the service of an old hand at making "Bio Gas" plants, Ramesh Saxena. This 10-cubic-meter floating iron tank 'Gobar Gas' plant works flawlessly till today, giving us methane gas to cook food, and slurry that is instantly usable as manure as harmful bacteria have died in the anaerobic heat of the biogas tank.

I read in one thoughtful essay that healthy soil gave birth to healthy plants and trees, and thus no diseases would strike healthy plants if the soil were full of nutrients; quite like humans eating a balanced, healthy, vegetarian diet. This was useful book knowledge, but I didn't really know how to build soil health as well as I knew to build mine. Neither did I know our sandy soil was so denuded of organic matter that it gave little nutrition to the plant to withstand pest attacks. On testing the soil much later in 2016, when testing at government laboratories was made free, I saw to my horror that our soil organic matter was a pitiable 0.2%. The gold standard in temperate ecologies is 5-10% organic matter, while tropical and arid soils are in the range of 1-2% - our soil organic matter was really not that out of whack. But I was no longer surprised that our plants were not as healthy, it was clear that the soil did not support

them adequately with nutrition. I had to make the manuring of the land as an ongoing project, after each crop. This was done with renewed vigor, but from 2016.

Neither was there a diversity of plants such that natural predators, like the ladybird, would be there to prey on pests. Our less-till, bio-diverse plant environment was yet a few years away. Instead, we made our own organic pest repellants (fermented garlic, chili, cow urine etc.) and micro-biotic soil amendments (fermented dung, urine, lentil powder etc.) learnt from organic farmers from South and West India. We applied these mechanically, and I gradually realised there was no benefit to applying teeming microorganisms on bare soil as the hot sun at 40 plus degrees Celsius kills these microbes immediately. The soil needs to be covered first with protection for the microbes - a layer of biomass to allow the microbes and other flora and fauna to work on eating the biomass and feed the roots of the trees and the crops. This knowledge, too, was a distance away.

However, unprecedented learning was part of the first intense 'operational' phase that lasted 2 years, till mid-2014. The daily tasks of setting up the farm, building a culture of trust and a work ethic with my men and woman, understanding the ecology, learning which crops and trees prospered were occupying. Many seeds had been sown in my fertile mind that now possessed a superficial understanding of the basic elements of conventional organic farming.

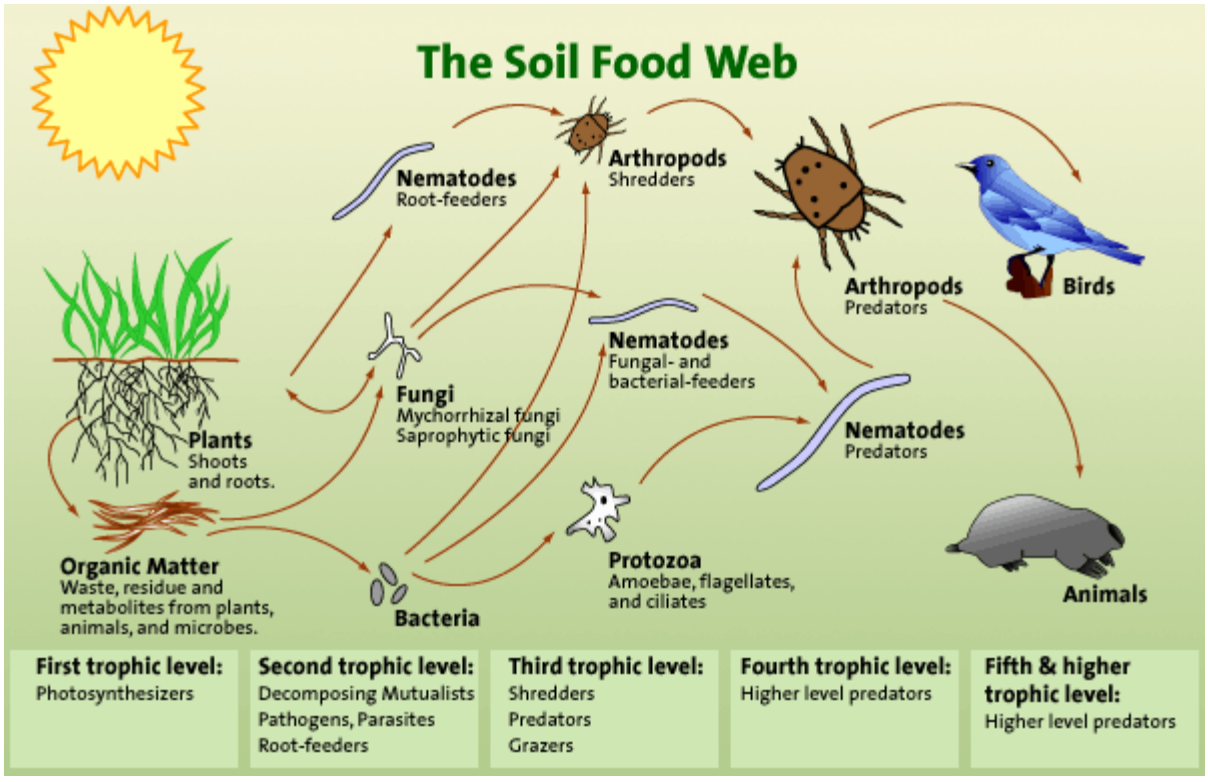
Intellectual change does not have a sequence, it happens when the time is right. The cumulative impacts of my experiences and the full weight of knowledge from others were settling in. Some change was instantaneous, like a revelation, but this too had an incremental gradualism that brought about the change. I had to embrace change, for that I needed an open mind willing to accept all possibilities; specially the humility that what I knew could be all wrong.

Natural Farming at Aman Bagh
Part III: 2014-2016

Our intensive farm operations continued, alongside a growing understanding of strategic issues. I started to understand the core message from Albert Howard [1] and other natural farming pioneers: **the forest is nature's farm**. No one waters the forest, no one manures or fertilises it, no one ploughs it and it is yet such a vibrant natural environment for microorganisms, animals, birds and all kind of plants and trees that co-exist for thousands of years in that forest as long as man does not intervene. What did natural farmers have to learn from nature's farm? That ploughing, irrigation, manuring, mono-cropping, and annual plants are over-rated. That trees are the real wonders of nature, and we should embrace them more than we usually do in agriculture.

> "Agricultural science has been misused to make the farmer, not a better producer of food, but a more expert bandit. He has been taught how to profiteer at the expense of posterity – how to transfer capital in the shape of soil fertility and the reserves of his livestock to his profit and loss account. In business such practices end in bankruptcy; in agricultural research they lead to temporary success. All goes well as long as the soil can be made to yield a crop. But soil fertility does not last forever; eventually the land is worn out; real farming dies."
> Howard, Albert. An Agricultural Testament. 1940

I heard Elaine Ingham, and American microbiologist and soil biology researcher: "Build the biology" she said, "the chemistry will take care of itself". I started to read up on soil biology (fungi, bacteria, nematodes, arthropods, protozoa) and the symbiosis of plants with these living organisms in the root zones that provide nutrition to each other and food for humans. Building life in the soil meant the availability of organic matter to provide a welcoming home and food for this biology. It was that simple.



[1] http://journeytoforever.org/farm_library/howard.html.

Building Soil Health

Building soil health through the continuous addition of organic matter became my core preoccupation. We started to add copious amounts from multiple sources, making sure it was chemical free. In 2016, for example, we added perhaps 100 tonnes of diverse biomass to feed the soil. None of this was visible to the naked eye, though, as the soil swallowed all like it was never applied. I realised the enormous appetite of the soil due to the cycle of continuous oxidation of soil carbon in our hot and arid ecology, and the depletion of nutrients from the soil taken up by crops and fruit trees. We applied 20 tonnes of our own cattle FYM on the fruit orchards and vegetable plots; purchased 40 tonnes of FYM twice a year for the tilled crop land; 10 tonnes of leaves and branches from trees growing in Aman Bagh; lugged 0.5 tonne of leaf waste from Gurgaon public parks; 0.5 tonne of vegetable and fruit waste from organic wholesaler Isayorganic,; 5 tonnes of sawdust from the village carpenter for deep mulch in all fruit tree basins once a year after the monsoon, and covered the entire floor of all our fruit orchards with 5 tonnes of local *Sarkanda* grass from the village commons in the winter; the many tonnes of the roots remnants of harvested crops ploughed into the soil and left to decompose; and finally the many tonnes of 'green manure' crops.

Through the addition of biomass, manure and compost we have commenced establishing islands of intense soil nutrition in the basins of all our perennial fruit trees, mirroring the primeval forest floor where leaves, trees and animal remains decompose by the action of the microbes and form food for the trees. The tree basins will be expanded as the trees grow, and 10 years from today we would have built extraordinary fertility in the soil of all the 'no-till'

fruit groves. Our sandy soil would become a marvel of nutrition, exhibiting attributes of alluvial loamy soil.

For our tilled and seasonally cropped land, we 'green manure' annually by ploughing in a nutrition-rich, bio-diverse cocktail of grasses and legumes into the soil before they flower, when they are grown to 3-4 feet. This means ploughing in the green manure crops 45 days after sowing and 15 days before planting the main food crop, depending on how much fallow time we have available. This nutrition – Nitrogen, along with micro-nutrients - makes a stunning difference to the growth of the main crop.

The 1,200 litres of microbiology-rich concoction *Jeevamrit* (applied alternatively every 15 days in fruit tree basins, in the vegetable beds, and in all cropped land) now has a perennial source of biomass, without the sun and wind desiccating them. The application and making of *Jeevamrit* has become an operational discipline.

We now follow a thumb rule of keeping 1 animal per acre of land, thus we have a ceiling of three cows, their progeny and our two bullocks – these will provide me 4 tonnes of cattle manure each year. We carefully plan the acreage sown under wheat, *Bajra* (pearl millet) and *Jowar* (sorghum) so we have sufficient hay for the full year. This is in addition to the green *Jowar* fodder during summer, and the green fodder cocktail of *Berseem* (clover), *Rijka* and more. The hay is stored for the year in *bonga* huts sustainably constructed with dried *Arhar* (pigeon pea) stalks, *Khatta* (local mulberry) branches and a waterproof roof of tightly woven dried *Sarkanda* grass (sachharum bengalense). The *bonga* is but one example of sustainable, local craft and ingenuity.

Bonga: a hay storage structure
Constructed from dried *Arhar* (pigeon pea) stalks, *Khatta* (mulberry) branches and a waterproof thatch roof of dried *Sarkanda* (grass) hay

A learning that reached critical mass in 2016 was to think like a resource-starved peasant in a poor rural economy, which automatically implies low external input and low-cost farming. Till now, I had been thinking like the urban middle class, for whom 500 rupees was as important as 50 rupees to the peasant and no wonder my costs were out of reach of the farms ability to earn. Rather than spin my wheels on increasing production through ways that would increase painful operational effort, I focused on reducing excess and waste in expenses. I have understood that poverty forces environmentally positive decisions, and establishes a live-with-less attitude, a simplicity that is worth emulating. As for revenue, it should come on my terms or not at all. If the produce is good, people should beat their way to my door.

My self-education continued apace via YouTube videos[2] through books and articles from a variety of global sources on organic farming; material on natural farming in Indian conditions by Bhaskar Save, Subhash Sharma and Subhash Palekar; and my first structured engagement with permaculture in November 2016 through Aranya in Hyderabad. Permaculture concepts, which had been only of great interest till now, became a reality through experimentation.

> "**The maintenance of the fertility of the soil is the first condition of any permanent system of agriculture**. In the ordinary processes of crop production fertility is steadily lost: its continuous restoration by means of manuring and soil management is therefore imperative."
>
> Albert, Howard. *An Agricultural Testament*. 1940

Fruit Trees, Seeds

We started to get comfortable with fruit tree manuring and watering requirements, their crop patterns, and managing fruit pests specially the pesky fruit fly attracted to Aman Bagh by the nearby urban waste landfill of Bandhwari. All the trees were fruiting happily – guava, Kinnow, citrus, mango – and we just had to ensure the harvesting; a harbinger of yet-to-come 'do-little' farming. For example, we earned 40,000 rupees from a quarter acre of land of *Kagzi Nimbu* (lemons), far more than any other cash or food crop could give us. We also planted 100 lemons and 50 Kinnow saplings along an extremely sandy soil patch of 15 feet wide along the periphery of Aman Bagh as a source 'do-little' farming from 2019, and a 30-tree mango orchard in another ¾th acre that will be the fifth 'fruit-forest' within Aman Bagh to go till-free and make over 50% of our farm free from the plough. The mango saplings of *Dasehri*, *Langda* and *Chausa* are two years old now, doing wonderfully well as I write in September 2017, purchased in Shahjahanpur Kithore in Meerut district from master mango breeder Hafiz Nafees Khan.

The *Beej Bhandar* (Seed Bank) was implemented as a formal initiative in late 2016, a responsibility that has been pushed onto the shoulders of a rather reluctant Abdul Sattar. He is not a structured thinker, and he yet keeps seeds in all parts of the farm where I least expect to find them: gourd seeds in their shells hanging on some random tree, or in a corner of the dairy. We have started storing seeds, carefully sun dried, at one location demarcated by season, kind (fruit, vegetable, cereal, lentil, flowering), and clearly labelled in clean glass bottles. Besides local seeds doing well, we have also seen that saplings grown from seed for perennial trees at our nursery at Aman Bagh do better than those brought from a commercial nursery, and in fact trees grown from seeds planted directly in the Aman Bagh soil are even healthier.

[2] Ernst Gotsch https://youtu.be/gSPNRu4ZPvE, many more on groforestry farming in Brazil. Video channels like https://www.youtube.com/user/eOrganic/featured and books like 'Gaia's Garden' the best-selling book on permaculture http://tobyhemenway.com/book/gaias-garden/

Water

We started to conserve rainwater in 2016 with advice from publications from the Center of Science and Environment in Delhi, and started to direct water collected in the monsoon from the roof-top to a reverse bore-well drilled to 70 feet into the underground aquifer. We learnt to build swales along the contour, and bunds to stop the rainwater and enable it percolate into the soil.

We have also ingrained a cultural practice of watering (mostly through our extensive drip and sprinkler irrigation system) only at twilight, and only through the state electricity system never the backup generator. We measured the water released into the soil after 1 hour and 2 hours of use of the drip-and-sprinkler system, and our irrigation experts Sattar and Nooruddin were shown the depth of the percolation by digging into the soil: they now use it wisely. They understand the need for 'wetness' (*nami*), and why plant roots don't need to be drenched in 2 feet of water. A water conservation mentality is a difficult one to give birth to, but when you start the journey it gets better every year.

A key water conservation strategy is to plant ecology-appropriate crops, we thus don't plant maize, sugarcane, or rice; and none of the Green Revolution water guzzler seed varieties - says, Haryana 711 wheat. We only use *desi* (local) seeds, for example wheat, pearl millet and sorghum which use much less water compared to Green Revolution seeds. Four fruit orchards are no-till, with a biodiversity of perennial grasses, other plants, bushes and trees which have established cooler micro-environments that reduce water evaporation and the frequency for watering. Finally, fruit tree basin mulching using biomass from flowering trees and sawdust absorbs and retains water for much longer periods and reduces the need and frequency of irrigation by half.

Pests

If we plant the crops at the right time, and in synchronicity with other farms, then pests are spread out over a larger land area and don't damage our crop appreciably. But when we plant too early or too late, when there are no other fields of that crop for them to feed on, then we face the music as all the birds and insects in our village flock to the picnic!

Our pest management policy has, in general, moved from preventive and scheduled spraying with fermented organic concoctions (cattle urine, chili, garlic, neem leaves etc.) to reactive

spraying on specific visual incidence of pests. This organic concoction is simply a repellant, not a destroyer of insects like chemical-based pesticides are. As our soil (and therefore our plants) grows healthier, we expect the incidence of pest damage will reduce. The enhanced plant biodiversity should also give rise to a happy balance of pests and predators. I think I see this already. In some instances, like the fruit fly which is devastating to fruits in the monsoon months and is unaffected by sprays of all kinds in all intensities, we were forced to physically bag the individual Guava and Kinnow fruits with netting bags made at home. It is a lot of labor, which we have in abundance at that time as there is no sowing or harvesting work, but works well. And whatever little pests do eat, we let them after all they too must eat.

Revenues and Expenses

The end of the rainbow holds little comfort for the soul, as I comprehend the terrible situation of the rural poor, landless and small or marginal peasant families alike. India is, after all, a very poor nation outside the middle-class world the English-speaking elite inhabits in our cities. With 17.5% of the world's population, and 2.5% of its land, there is (at one level) no solution that can get us out of our nightmare. The reality is that 67% of Indian farming households (of 5) earned less than 20,000 rupees a month in 2016. And with this money they can do little more than survive at the margins of civilization. These families somehow get by, their own-farm work interspersed with paid labor (like the five peasants at Aman Bagh); with large families where everybody who can must earn. Where is the money for education, health, entertainment, marriage and death?

This brutal reality of daily survival for over 800 million across India people runs through like a shadowy documentary across my mind often, especially as I return home each day to my comfortable urban life in Gurgaon. It is a constant surprise to see cheerful faces of peasants, struggling as they are with the challenges of daily survival.

Aman Bagh does not earn anywhere near what we spend, and that is not (entirely) by design. It is adequately clear that revenues (even our much higher 'organic' price realization) from only 6 acres cannot enable us break-even if we continue to farm experimentally (as we will for quite some time), seeking a stable revenue model; and employ 5 people. In a steady state, maybe in 3 years, when the soil has been enriched and the fruit orchards are fully on stream for easily marketable food, we could reduce wage costs to 2 full time people and recruit 'labor' seasonally as the cycle requires. It is possible.

However, I cannot bring myself to apply only a cost-based approach to people wages today - the Aman Bagh Five are part of an intimate community we have built so painstakingly over five years. I know their lives, their families, their fears, their poverty and their stoic spirit. I cannot 'let them go', because the place they will go to will be significantly worse. A peasant and his family of 5 could possibly make 10,000 rupees a month from a 6-acre farm – without returning him wages for his labor - if all the trees were stripped away, if cash crops were planted on the entire 6 acres, if he lived in a one room hut on the land, and ate sparingly. A peasant's life on 6 acres today is as difficult as mine is easy.

What we have done is stripped all non-wage expenses to the minimum, and that is a lesson well learnt. A small farmer would never have let his expenses get ahead of his revenues ever, it would have been impossible. Aman Bagh earns 40% of its expenses, up from 20% 2 years ago. As we strip away our excesses, and build the soil, there is hope. But it is yet very, very complex. Aman Bagh will have to afford to run as it is, and I leave it at that for now.

5 Experiential Principles of Natural Farming at Aman Bagh
from Albert Howard

1. Interdependence of all living things. Work with nature, do not try to dominate it. Apply traditional knowledge and science to maintain the unity of growth and decay. *"The forest manures itself"*

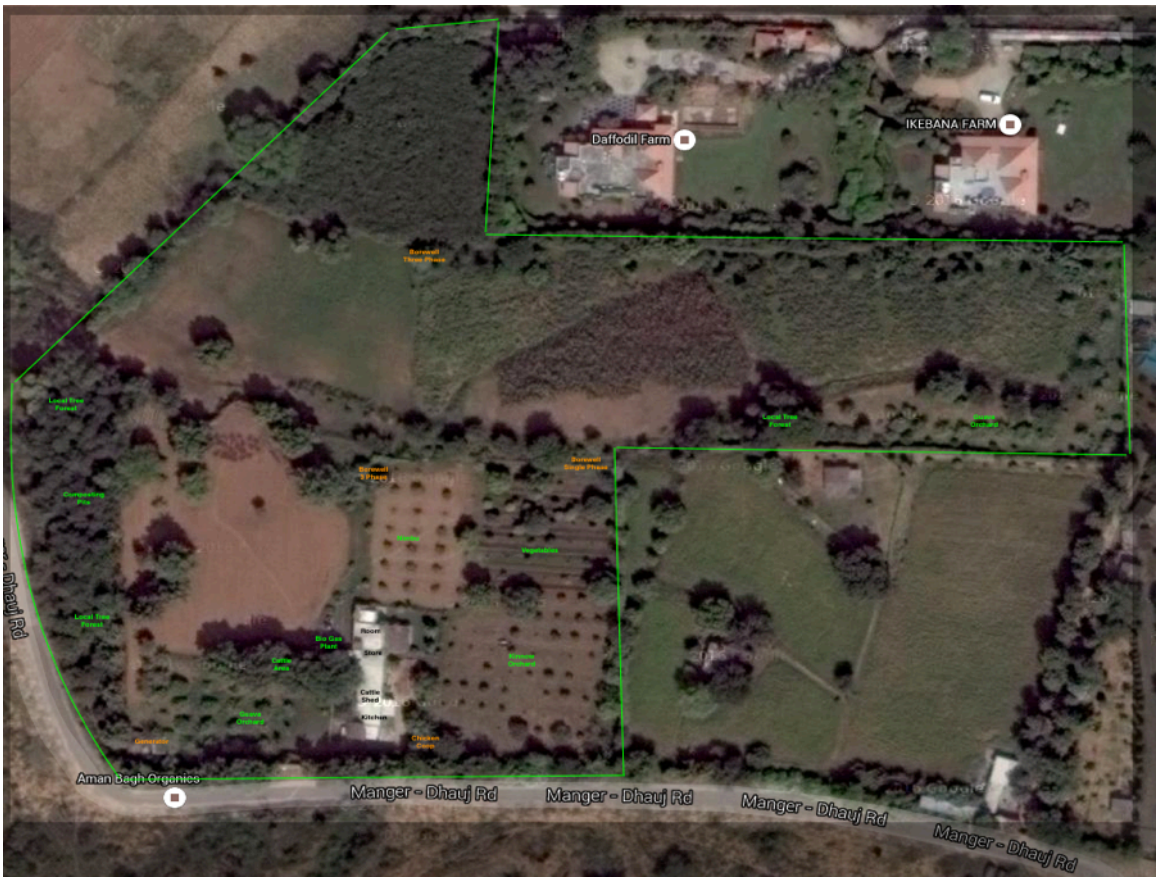
2. Biodiversity of plant (perennial and annual) and animal life is required for the soil food web to thrive. No monocultures. *"Mixed crops are the rule"*

3. Self-sufficiency, with minimal external inputs to the farm. No food, seeds, fertilisers, pesticides, fossil fuels from outside the farm. *"Crops and ….[domestic animals] look after themselves."*

4. Sustainability. Take only that much out of the soil as one puts back in, make the land and the processes it viable for generations. *"The soil is always protected from the direct action of the sun, rain and wind."*

5. Local knowledge of soil, crops, seeds, weather, cattle and the people is key

Natural Farming at Aman Bagh: 2017



2017 enabled me move beyond farming operations, as the Aman Bagh systems work smoothly for the execution of our established best practices.

Building the soil has become the fundamental farm strategy and defines our package of practices. Our farm operations are constantly working to protect and grow the soil biology in plant root zones, and we no longer worry about the chemistry (N, P, K and micronutrients) which we are confident will happen in natural course. Scientists say there are enough nutrients locked in all soils for generations, the question is to have enough animal life in there to help release them in a form that is bio-available for the plants. I have started to recognize life as active below the soil as I see it above: the extensive roots talking to each other, the microscopic bacteria, fungi and protozoa that life within these roots in symbiosis, the mites, earthworms, termites, ants, rats and more.

Another key strategy is building **plant biodiversity** that feeds directly into microbe and plant health. We have added biodiversity in each fruit orchard by adding 100 Papaya, 200 Moringa, 50 *Sharifa* (Custard Apple), and a sprinkling of *Chiku*, *Shahtoot* (Mulberry), *Phalsa* (Indian Currant), and hundreds of slips of *Khas* (Vetiver) grass as ground cover in the fruit orchards. On our cropped land, we are intensifying schemes for multi-cropping, crop rotation, companion cropping, and growing bio-diverse perennial plant life we are seeing healthier plant life.

Our multi-layered fruit groves have tall trees at the periphery as windbreaks and as biomass for mulching, we have planted a next level of Moringa that when grown to 20 feet will protect the fruit trees below by allowing the sun to filter through their small leaves while its fruit and

leaves provide revenue; fruit trees of *Amrood* and *Kinnow*; tall bushes of perennial *Arhar*, interspersed with Papaya; understory of vetiver, *Kans,* lemongrass, herbs; and a ground cover of *doob* grass. No soil is seen in my orchards today, no rain or wind or sun to disturb the army of different battalions from the animal kingdom that eat the vegetation and feed the soil in the cycle of life.

Our 'No-Till' perennial fruit orchards are today 40% of all our land, these will move to 50% by 2019 as our new 3/4th acre mango orchard comes on stream: we will further reduce the intensive cycle of till-sow-de-weed-harvest that disturbs soil, oxidises tied-in Carbon, and yokes the peasant to high-intensity labour and Aman Bagh to low revenue annual crops. The biodiverse fruit groves are slowly and visibly enabling the building of orchard soil; and as the fruits are higher priced produce we are moving to a portfolio the generates higher revenue throughout the year.

Agroforestry (a system combining agricultural crops and forest ecosystems) within Aman Bagh is a source of water conservation, provides us cooler and gentler microenvironments, and valuable biomass for mulching. We now allow flowering, evergreen and medicinal trees to grow all over the farm on *mends* and *bunds*, their seeds carried and planted by birds, animals and the wind. We have also embraced the practice of pollarding trees (cutting the main trunk at 6-7 feet from ground) as a way to gain mulch. We continue to grow many more evergreen and flowering trees so that no bio-mass needs to come from outside the farm.

The Past in the Future

The challenges that remain are substantial and long-term, the first being how to break even. The second is water sustainability in our arid land, where I pump out more water from the aquifers then I put back in. And finally, energy sustainability perhaps by going off the grid.

The outcomes are many, and few are answers.

Aman Bagh started with a desire to be in the village and grow local food for myself and my family. That is more than achieved, and I continue to evolve in my understanding of personal health through food as nutrition. I eat as if I were rural west UP in 1959 (the year I was born) with the critical exceptions of milk - unthinkable for my country cousins, indeed most Indians. The modern consumer economy of supermarket, packaged plenty – overseas or Indian - simply does not exist for me. My diet is mostly 'whole plant food' while means exactly that: no animal products including milk or its extracts, (almost) no oils, no juices, no smoothies. My meals comprise local cereals wheat, barley, oats, sorghum and millets, a range of lentils, some nuts, and a profusion of vegetables and fruits. This was not always so, but it was headed in this direction over the decades and Aman Bagh brought me closer to the truth of a whole plant, vegetarian diet. I'm not at all sure if this is right for everyone, but it works for my well-being.

What has been completely unexpected is the deepening of an organic understanding of rural north India, its poverty, contradictions, challenges, and a realisation of opportunities to contribute stuffing my finger in a dike. This engagement with rural life brought me an understanding of traditional livelihoods in the villages, the once dominant handlooms and handicrafts, their decimation by the colonial British and by us brown sahibs who construct taxes to take away even their shrunken present. Understanding the farm and the village, I also see that the state of our environment is deeply connected to livelihoods in inverse ratio as we follow the destructive ways of Rich nation consumerism and the market. I see little hope in a

nation with 17.5% of the world's population and 2.5% of its land, the corporation and the market it sets up even more ubiquitous and all powerful than it ever was, and the single story of urbanisation playing out as the false redemption of mankind. But I am yet driven to look for and create alternative stories, such that the ultimate resting place of our civilisation is not in the city but in another kind of village. Perhaps Aman Bagh has a bit of that magic.

Over these years, I have become part of a community of the most unexpected companions unlike any I have known my entire life of an urban, English educated, globally travelled, arrogant, self-obsessed lout. My early life provided me an identification with the villager and my wife Rabab prised open my closed mind; *'Insaniyat, Na Jati, Na Dharm'* was my expectation from Aman Bagh in 2012. My Muslim and Dalit fellow travellers have given me glimpses into worlds that have opened that third eye. Yes, we can co-exist, we can transform and no longer look at the other telling us a 'single story'.

We were given denuded land, sandy and completely open to the deadly sun, wind and rain; with 100 trees. We have planted 1,400 more trees, and our soil is protected and covered with plants of all kinds and sizes. We have added 250 tonnes of organic matter to our soil, more than we have taken out of it. This enabled us organic certification for our processes, which matters but not that much.

My anxiety of not knowing enough and making mistakes has greatly reduced, not because I know much but because I see Aman Bagh's 'green carpet' more in harmony with the cycle of nature. There is much to be done, but I have witnessed an explosion of insect, bird and animal life of all kinds, proof how our diverse environment has brought a new reality to the land.

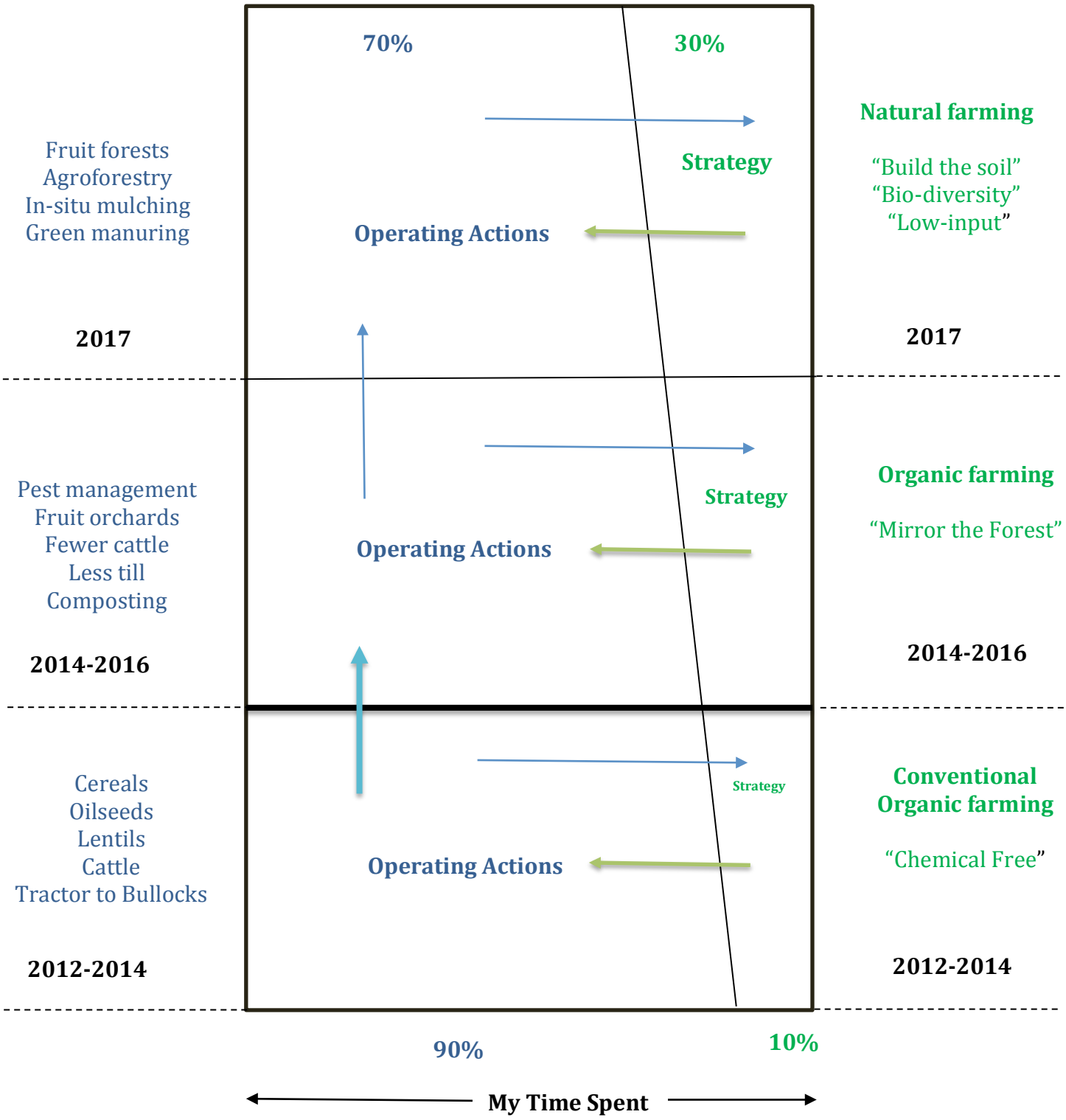
I didn't realise formal education was so very overrated till I entered Aman Bagh to learn about nature's rhythm, and till today I don't know a tenth as much as an 'illiterate'. I have come to a new awareness of enormous traditional knowledge residing in people without letters, undocumented in a nation that has only an experiential and oral tradition of documenting peoples' experiences. How can an encyclopaedic knowledge of local plants and their use, for example, co-exist with illiteracy? Education has meant the city, and a breaking of the bond with nature. While we cannot give the peasant and the landless poor what they need, should we strip him of his self-respect by calling him 'illiterate' 'uneducated' and reducing him to a labourer constructing the roads our cars can speed by on? How divorced can modern subject based classroom education get from knowledge and sustainable livelihoods?

I see many thousands of well-meaning people – consumers, farmers, activists - across India who believe in the redemptive nature of organic food and organic farming, people worried about chemical poisons in all our foods, and how these are connected to the state of our environment. This is an increasing tribe, and a very welcome trend. On the other hand, the new 'organic food' segment (of the 2% of Indian households who earn more than 50,000 rupees a month) belongs to the same powerful market that works to degrade the land and the environment by selling us jet planes, cars, two-wheelers, oil refineries, tractors, pesticides, fertilisers, hybrid and GM seeds, packaged foods that the better-off classes consume. There are people in the cities who view organic food as a personal health choice in a very limited sense: they want the chemical-free food, but they don't want to recognise that our unsustainable consumptive lifestyles are leading to these poisoned foods in the first place. Can we be happy with organic cookies delivered to us by Amazon in plastic bags when our air is not breathable, our forests are being decimated, our wildlife is down to a fraction of what it

was just 25 years back, our cities are unliveable, and the village soil poisoned? Then, there are 60% of India's peasants and rural labour who farm on rain-fed land, without access to year-round irrigation, and they are 'organic-by-default' as indeed all our peasant ancestors where in 1960 before the Green Revolution. The rural poor certainly grow organic food, but they themselves live on the fringes of survival. Finally, there are the 40% irrigated land farmers who have a better life than their rain-fed cousins – but these are fully invested in chemical farming, lifestyle diseases, and the aspirational consumerist lifestyle. How do we reconcile these four very different groups?

Questions around complex and seemingly unsolvable problems need simple answers to let us slip out from under the overwhelming weight of the present. We should all worry about these problems, but we must also do - for one, start growing our own food without chemicals, or seek out and actively support those who do so locally.

And when you visit a farm, which you really must, look look long and hard at the sun-beaten face of the slim peasant and realise he and his ancestors have fed us for generations. He might very well yet be uneducated in letters, but he carries the enormous weight of knowledge of growing food for all of us who simply consume it. He deserves your respect, your compassion, and yes your money.



Transitions in Thinking and Action at Aman Bagh